



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In the Application of:

PAGE ET AL.

CASE NO.: IJ0005 US NA

SERIAL NO.: 09/120,608

GROUP ART UNIT: 1714

FILED: JULY 22, 1998

EXAMINER: C.E. SHOSHO

FOR: WATER INSOLUBLE NON-IONIC GRAFT
COPOLYMERS

Commissioner for Patents
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APPELLANTS' BRIEF ON APPEAL

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I. INTRODUCTION

The claims in this application are 13-23.

This is an appeal from the final rejections of claims 13-23 entered in the Final Office Action dated July 29, 2003 (Paper #29).

A Notice of Appeal against the final rejections was filed October 29, 2003. As a consequence, a Petition for an Extension of Time under 37 C.F.R. §1.136 requesting a one (1) month extension of time for submitting this paper is enclosed.

II. REAL PARTY IN INTEREST

The real party in interest is E.I. du Pont de Nemours and Company (Wilmington, DE).

III. RELATED APPEALS OR INTERFERENCES

It is believed that there are no related appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

IV. STATUS OF THE CLAIMS

This application was originally filed with claims 1-12 directed to a non-ionic graft copolymer (claims 1-5), an aqueous coating composition based on this non-ionic graft copolymer (claims 6-11), and a washfast ink composition based on this non-ionic graft copolymer (claim 12).

In a first non-final Office Action entered in the case (Paper #2), claims 1-12 were variously rejected on art grounds. In response thereto, the Appellants canceled claims 1-5, and amended claims 6 and 12.

In a second non-final Office Action (Paper #5), remaining claims 6-12 were variously rejected on art grounds. In response thereto, no further claims amendments were made.

In a first final Office Action (Paper #10), remaining claims 6-10 were once again rejected on art grounds. A "Response after Final Rejection" was filed in reply without making any claim amendments.

An Advisory Action (Paper #12) was then sent in which the claim rejections were maintained, after which the Appellants filed a first Request for Continued Examination with an accompanying response. No claim amendments were made in the response.

Next, a third non-final Office Action (Paper #16) was sent, once again maintaining the rejection of remaining claims 6-10 on art grounds. A response was filed in reply without making any claim amendments.

A second final Office Action (Paper #20) then followed, once again maintaining rejection of all the claims.

Unintentionally, no response was initially filed to the second Final Office Action, and the application went unintentionally abandoned. Upon being notified of the unintentional abandonment, the Appellants timely filed a Petition to revive this unintentionally-abandoned application, along with a second Request for Continued Examination with an accompanying response. In the response, claims 6-12 were canceled and replaced with new claims 13-23 directed to an aqueous coating composition (claims 13-18) and a washfast ink composition (claims 19-23).

The Appellants' Petition was granted (Paper #25), and a fourth non-final Office Action (Paper #26) followed. In this fourth non-final Office Action, claims 13-23 were rejected on art grounds, and a response was filed in reply without making any claim amendments.

Finally, a third final Office Action (Paper #29) issued in which claims 13-23 were finally rejected on art grounds. A Notice of Appeal was filed against this final rejection.

The claims in this application are thus 13-23. A clean copy of these claims is attached hereto as Appendix A.

V. STATUS OF AMENDMENTS

No amendment to the claims was filed subsequent to the third final rejection (Paper #29), and no amendment remains outstanding.

VI. SUMMARY OF INVENTION

The present invention as set forth in claims 13-23 relates to an aqueous coating composition (claims 13-18) and a washfast ink (claims 19-23) based on an aqueous vehicle, a pigment dispersion and a binder additive.

The aqueous vehicle comprises water and at least one organic co-solvent, wherein water is no more than 80% by weight of the aqueous vehicle.

The pigment dispersion comprises a pigment and a polymeric dispersant (first polymer).

The binder additive is a film-forming, non-ionic graft copolymer with a hydrophobic backbone and non-ionic, hydrophilic side chains, wherein the graft copolymer is in and of itself not soluble in water, but is soluble in the aqueous vehicle (water + co-solvent).

As discussed in the present specification, the compositions as defined in the present claims provide smear, abrasion and washing resistance of images made with the compositions. The binder component has been found effective in helping the claimed compositions achieve this resistance, and the fact that the binder component is film-forming and not soluble in water is believed to assist in this achievement.

The types of compositions as claimed, however, do often have stringent formulation needs such as viscosity tolerance and drying properties (see the paragraph bridging pages 1 and 2 of the specification), which is greatly affected by the type of polymer and polymer content. The binder as set forth in the present claims, therefore, is soluble in the aqueous vehicle (which contains a relatively large amount of co-solvent), which is believed to assist in being able to formulate useable (sprayable and/or jettable) compositions.

VII. ISSUES

35 U.S.C. §103(a) - are claims 13-23 unpatentable over the disclosure of Ma et al (EP-A-0851014) ("Ma-1") in view of Ma et al (US5085698) ("Ma-2")?

VIII. GROUPING OF CLAIMS

In the context of the present issue as set forth above (both cited references relating to aqueous, pigmented inkjet ink compositions), the present claims stand or fall together.

IX. ARGUMENT

The sole rejection is of claims 13-23 under 35 U.S.C. §103(a) as allegedly being obvious over the disclosure of Ma-1 in view of Ma-2. The Appellants traverse this rejection.

Ma-1, in its most relevant aspects, discloses an ink jet ink generally comprising components (a) and (b) as set forth above, in combination with a hydrosol polymer.

The hydrosol polymer of Ma-1 is stated to be water-insoluble (page 4, line 11), as is component (c) above. The hydrosol, however, should not be "completely soluble" in the aqueous vehicle (page 4, lines 27-29), while component (c) is required to be soluble in the aqueous vehicle.

It should be noted that, while the Appellants admit that Ma-1 discloses the potential use of large amounts of co-solvents in the aqueous vehicle, the Appellants would also note the preferences of Ma-1 tend toward lower amounts of co-solvents. The combination in the present claims of a polymer soluble in an aqueous vehicle, and an aqueous vehicle in which the polymer is soluble, is relevant to the patentability of the claimed invention in view of the cited art.

The Examiner has raised an issue regarding the meaning of "soluble" in the context of the present invention versus the disclosure of Ma-1, which the Appellants submit actually defines a clear distinction between the disclosure of the reference and the invention being claimed.

It is the Examiner's position that any degree of solubility of the hydrosol of Ma-1 makes that hydrosol "soluble" in the aqueous vehicle within the context of the claimed invention. The Appellants submit that the Examiner's claim language interpretation is not in line with the plain meaning of the word "soluble", particularly in view of the disclosure of the specification.

The graft polymer as set forth in the present claims is insoluble in water but soluble in the aqueous vehicle. The hydrosol as set forth in Ma-1 is insoluble in both water as well as the aqueous vehicle, although it can be stably dispersed (two-phase) in the aqueous vehicle. This distinction between the hydrosol of Ma-1 and the graft polymer of the present claims is made clear by the discussion in Ma-1 in lines 11-12 on page 4 ("The hydrosol polymers are ... dispersed as a separate phase in the aqueous carrier medium."). In fact, Ma-1 makes clear that the hydrosol should **not** be soluble in the aqueous vehicle (page 4, lines 27-29).

The Appellants would at this point note a distinction between a water-insoluble polymer and a polymer "being soluble in the aqueous vehicle", and a "soluble" polymer versus a "dispersible" polymer. As stated in the claims and in lines 34-38 on page 3 of the specification, the aqueous vehicle is a "single-phase" mixture of water and a co-solvent.

A polymer may contain sufficient hydrophilic functionality to be in and of itself water soluble in the sense of a single-phase mixture (mixture on a molecular level). The same general type of polymer with less hydrophilic functionality may be stably and uniformly dispersed in water, but the mixture exists as a two-phase system - a discontinuous solid (or semi-solid) polymer phase and a continuous water phase. The discontinuous solid (e.g., hydrophobic polymer portion) is stabilized in the mixture by the presence of the hydrophilic functionality, but the polymer is nonetheless not soluble and present as a separate phase.

In certain instances, the two-phase dispersed systems can be converted into a single-phase mixture by the presence of an "effective" amount of a co-solvent which is miscible with (or soluble in) water, and in which the polymer is miscible or soluble. The aqueous vehicle (medium) as set forth in the present claims is a mixture of water and a relatively high amount of one or more co-solvents. This relatively high amount of co-solvent presumably assists the ability of the graft polymer to be soluble in the aqueous vehicle.

As is evident from the above discussion, Ma-1 as compared to the claimed invention is deficient in its disclosure of a graft polymer soluble in the aqueous medium, particularly in combination with an aqueous medium in which the graft polymer is soluble, and in fact teaches away from using such a combination. Ma-1, therefore, in and of itself neither discloses nor suggests the claimed invention.

Ma-2 does not remedy this defect in the disclosure of Ma-1. Ma-2 in fact is only cited by the Examiner as a disclosure of co-solvents useable in ink jet inks, and simply provides no direction or teaching which would lead one of ordinary skill in the art to modify the disclosure of Ma-1 in the manner required to achieve the presently claimed invention. There is thus no supportable basis for the obviousness rejection of the present claims based on this combination of Ma-1 and Ma-2.

The question in assessing patentability over the disclosure of Ma-1, either considered singly or in combination with Ma-2, is: does the art fairly discloses all of the components required to achieve the present invention, then suggest to the person of ordinary skill in the art the combination of those elements in the manner required to render the claimed invention obvious? In answering this question, it should be kept in mind that it "is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In re Wesslau, 147 U.S.P.Q. 391, 393 (C.C.P.A. 1965).

Based upon the totality of the evidence, the Appellants submit that there is no teaching, suggestion or other motivation for the person of ordinary skill in the art to arrive at the claimed invention from the disclosure of Ma-1 (with or without Ma-2). In fact, if any relevant teaching can be derived from Ma-1, such teaching is in a direction away from the presently claimed invention. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from

the path that was taken by the applicant. The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant." In re Gurley, 31 U.S.P.Q.2d 1130, 1131 (Fed. Cir. 1994).

In view of the arguments above and the current record as a whole, the Appellants respectfully submit that the Examiner has not substantiated the obviousness rejection of the present claims based on the cited art. The Appellants thus request reversal of this rejection as applied to claims 13-23.

X. CONCLUSION

As is clear from the above as well as the arguments already of record, the approach taken by the Examiner and the rejections which flow therefrom clearly have no basis in law or fact. The Appellants, therefore, submit that the presently claimed invention is patentable over the art of record, request that the rejection of record be reversed, and further request that the Examiner be directed to:

- (i) allow claims 13-23, and
- (ii) advance the present application to issue at the earliest possible date.

Respectfully submitted,



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APPENDIX A
Claims 13-23 Pending in
Application Serial No. 09/120,608

13. An aqueous coating composition comprising:

(a) an aqueous vehicle comprising water and at least one organic co-solvent, wherein water comprises no more than 80% by weight of the total weight of the vehicle, and wherein the co-solvent is water-soluble or water-miscible so as to form a single phase vehicle with water;

(b) a pigment dispersion comprising a pigment and a polymeric dispersant, and

(c) a film-forming, non-ionic graft copolymer binder comprising a hydrophobic backbone and non-ionic, hydrophilic side chains, said side chains having a number average molecular weight of at least 500, wherein the graft copolymer is soluble in the vehicle but substantially insoluble in water.

14. The composition of claim 13, wherein said aqueous vehicle comprises 60-70% by weight of water based on the total weight of the vehicle.

15. The composition of claim 13, comprising:

(a) an aqueous vehicle comprising water, a water miscible pyrrolidone, and a glycol ether, wherein water comprises no more than 80% by weight, based on the total weight of the vehicle;

(b) a graft copolymer binder having a hydrophobic backbone and non-ionic, hydrophilic side chains, which binder is soluble in the aqueous vehicle but substantially insoluble in water; and

(c) a surfactant selected from the group consisting of silicon surfactants and fluorinated surfactants.

16. The composition of claim 13, wherein the graft copolymer backbone is comprised of monomers selected from the group consisting of methyl acrylate, methyl methacrylate, styrene, alpha-methyl styrene, phenyl acrylate, phenyl methacrylate, benzyl acrylate, benzyl methacrylate, 2-phenylethyl

acrylate, 2-phenylethyl methacrylate, 2-phenoxyethyl acrylate, 2-phenoxyethyl methacrylate, 1-naphthalyl acrylate, 2-naphthalyl acrylate, 2-naphthalyl methacrylate, p-nitrophenyl acrylate, p-nitrophenyl methacrylate, phthalimidomethyl acrylate, phthalimidomethyl methacrylate, N-phenyl acrylamide, N-phenyl methacrylamide, N-benzyl acrylamide, N-(2-phenylethyl)acrylamide, N-(2-phthalimidooethoxymethyl) acrylamide, vinyl benzoate, ethyl acrylate, n-butyl acrylate, 2-ethylhexyl acrylate, ethyl methacrylate, n-butyl methacrylate, t-butyl methacrylate, 2-ethylhexyl methacrylate, cyclohexyl methacrylate, vinyl acetate, and vinyl butyrate.

17. The composition of claim 13, wherein the side chains have a number average molecular weight of 1000-2000 and comprise macromonomers which are

- (a) soluble in water but are insoluble in non-polar organic solvents; and
- (b) made from non-ionic monomers selected from the group consisting of ethyoxytriethylene glycol methacrylate, methoxypolyethylene oxide methacrylate, methoxypolyethylene oxide acrylate, polyethylenoxide methacrylate, polyethylenoxide acrylate, and N-vinyl pyrrolidone.

18. The composition of claim 13, wherein the side chains comprise 15 - 60% by weight of the graft copolymer.

19. A washfast ink composition for use in printing of textiles comprising:

- (a) an aqueous vehicle comprising water and at least one organic co-solvent, wherein water comprises no more than 80% by weight of the total weight of the vehicle, and wherein the co-solvent is water-soluble or water-miscible so as to form a single phase vehicle with water;

- (b) a pigment dispersion comprising a pigment and a polymeric dispersant, and

- (c) a film-forming, non-ionic graft copolymer binder comprising a hydrophobic backbone and non-ionic, hydrophilic side chains, said side chains having a number average molecular

weight of at least 500, wherein the graft copolymer is soluble in the vehicle but substantially insoluble in water.

20. The ink composition of claim 19, wherein said aqueous vehicle comprises 60-70% by weight of water based on the total weight of the vehicle.

21. The ink composition of claim 19, wherein the graft copolymer backbone is comprised of monomers selected from the group consisting of methyl acrylate, methyl methacrylate, styrene, alpha-methyl styrene, phenyl acrylate, phenyl methacrylate, benzyl acrylate, benzyl methacrylate, 2-phenylethyl acrylate, 2-phenylethyl methacrylate, 2-phenoxyethyl acrylate, 2-phenoxyethyl methacrylate, 1-naphthalyl acrylate, 2-naphthalyl acrylate, 2-naphthalyl methacrylate, p-nitrophenyl acrylate, p-nitrophenyl methacrylate, phthalimidomethyl acrylate, phthalimidomethyl methacrylate, N-phenyl acrylamide, N-phenyl methacrylamide, N-benzyl acrylamide, N-(2-phenylethyl)acrylamide, N-(2-phthalimidoethoxymethyl) acrylamide, vinyl benzoate, ethyl acrylate, n-butyl acrylate, 2-ethylhexyl acrylate, ethyl methacrylate, n-butyl methacrylate, t-butyl methacrylate, 2-ethylhexyl methacrylate, cyclohexyl methacrylate, vinyl acetate, and vinyl butyrate.

22. The ink composition of claim 19, wherein the side chains have a number average molecular weight of 1000-2000 and comprise macromonomers which are

(a) soluble in water but are insoluble in non-polar organic solvents; and

(b) made from non-ionic monomers selected from the group consisting of ethyoxytriethylene glycol methacrylate, methoxy-polyethylene oxide methacrylate, methoxypolyethylene oxide acrylate, polyethylenoxide methacrylate, polyethylenoxide acrylate, and N-vinyl pyrrolidone.

23. The ink composition of claim 19, wherein the side chains comprise 15-60% by weight of the graft copolymer.



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The claims in this application are thus 13-23. A clean copy of these claims is attached hereto as Appendix A.

V. STATUS OF AMENDMENTS

No amendment to the claims was filed subsequent to the third final rejection (Paper #29), and no amendment remains outstanding.

VI. SUMMARY OF INVENTION

The present invention as set forth in claims 13-23 relates to an aqueous coating composition (claims 13-18) and a washfast ink (claims 19-23) based on an aqueous vehicle, a pigment dispersion and a binder additive.

The aqueous vehicle comprises water and at least one organic co-solvent, wherein water is no more than 80% by weight of the aqueous vehicle.

The pigment dispersion comprises a pigment and a polymeric dispersant (first polymer).

The binder additive is a film-forming, non-ionic graft copolymer with a hydrophobic backbone and non-ionic, hydrophilic side chains, wherein the graft copolymer is in and of itself not soluble in water, but is soluble in the aqueous vehicle (water + co-solvent).

As discussed in the present specification, the compositions as defined in the present claims provide smear, abrasion and washing resistance of images made with the compositions. The binder component has been found effective in helping the claimed compositions achieve this resistance, and the fact that the binder component is film-forming and not soluble in water is believed to assist in this achievement.

The types of compositions as claimed, however, do often have stringent formulation needs such as viscosity tolerance and drying properties (see the paragraph bridging pages 1 and 2 of the specification), which is greatly affected by the type of polymer and polymer content. The binder as set forth in the present claims, therefore, is soluble in the aqueous vehicle (which contains a relatively large amount of co-solvent), which is believed to assist in being able to formulate useable (sprayable and/or jettable) compositions.

VII. ISSUES

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VIII. GROUPING OF CLAIMS

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IX. ARGUMENT

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The hydrosol polymer of Ma-1 is stated to be water-insoluble (page 4, line 11), as is component (c) above. The hydrosol, however, should not be "completely soluble" in the aqueous vehicle (page 4, lines 27-29), while component (c) is required to be soluble in the aqueous vehicle.

It should be noted that, while the Appellants admit that Ma-1 discloses the potential use of large amounts of co-solvents in the aqueous vehicle, the Appellants would also note the preferences of Ma-1 tend toward lower amounts of co-solvents. The combination in the present claims of a polymer soluble in an aqueous vehicle, and an aqueous vehicle in which the polymer is soluble, is relevant to the patentability of the claimed invention in view of the cited art.

The Examiner has raised an issue regarding the meaning of "soluble" in the context of the present invention versus the disclosure of Ma-1, which the Appellants submit actually defines a clear distinction between the disclosure of the reference and the invention being claimed.

It is the Examiner's position that any degree of solubility of the hydrosol of Ma-1 makes that hydrosol "soluble" in the aqueous vehicle within the context of the claimed invention. The Appellants submit that the Examiner's claim language interpretation is not in line with the plain meaning of the word "soluble", particularly in view of the disclosure of the specification.

The graft polymer as set forth in the present claims is insoluble in water but soluble in the aqueous vehicle. The hydrosol as set forth in Ma-1 is insoluble in both water as well as the aqueous vehicle, although it can be stably dispersed (two-phase) in the aqueous vehicle. This distinction between the hydrosol of Ma-1 and the graft polymer of the present claims is made clear by the discussion in Ma-1 in lines 11-12 on page 4 ("The hydrosol polymers are ... dispersed as a separate phase in the aqueous carrier medium."). In fact, Ma-1 makes clear that the hydrosol should **not** be soluble in the aqueous vehicle (page 4, lines 27-29).

The Appellants would at this point note a distinction between a water-insoluble polymer and a polymer "being soluble in the aqueous vehicle", and a "soluble" polymer versus a "dispersible" polymer. As stated in the claims and in lines 34-38 on page 3 of the specification, the aqueous vehicle is a "single-phase" mixture of water and a co-solvent.

A polymer may contain sufficient hydrophilic functionality to be in and of itself water soluble in the sense of a single-phase mixture (mixture on a molecular level). The same general type of polymer with less hydrophilic functionality may be stably and uniformly dispersed in water, but the mixture exists as a two-phase system - a discontinuous solid (or semi-solid) polymer phase and a continuous water phase. The discontinuous solid (e.g., hydrophobic polymer portion) is stabilized in the mixture by the presence of the hydrophilic functionality, but the polymer is nonetheless not soluble and present as a separate phase.

In certain instances, the two-phase dispersed systems can be converted into a single-phase mixture by the presence of an "effective" amount of a co-solvent which is miscible with (or soluble in) water, and in which the polymer is miscible or soluble. The aqueous vehicle (medium) as set forth in the present claims is a mixture of water and a relatively high amount of one or more co-solvents. This relatively high amount of co-solvent presumably assists the ability of the graft polymer to be soluble in the aqueous vehicle.

As is evident from the above discussion, Ma-1 as compared to the claimed invention is deficient in its disclosure of a graft polymer soluble in the aqueous medium, particularly in combination with an aqueous medium in which the graft polymer is soluble, and in fact teaches away from using such a combination. Ma-1, therefore, in and of itself neither discloses nor suggests the claimed invention.

Ma-2 does not remedy this defect in the disclosure of Ma-1. Ma-2 in fact is only cited by the Examiner as a disclosure of co-solvents useable in ink jet inks, and simply provides no direction or teaching which would lead one of ordinary skill in the art to modify the disclosure of Ma-1 in the manner required to achieve the presently claimed invention. There is thus no supportable basis for the obviousness rejection of the present claims based on this combination of Ma-1 and Ma-2.

The question in assessing patentability over the disclosure of Ma-1, either considered singly or in combination with Ma-2, is: does the art fairly discloses all of the components required to achieve the present invention, then suggest to the person of ordinary skill in the art the combination of those elements in the manner required to render the claimed invention obvious? In answering this question, it should be kept in mind that it "is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In re Wesslau, 147 U.S.P.Q. 391, 393 (C.C.P.A. 1965).

Based upon the totality of the evidence, the Appellants submit that there is no teaching, suggestion or other motivation for the person of ordinary skill in the art to arrive at the claimed invention from the disclosure of Ma-1 (with or without Ma-2). In fact, if any relevant teaching can be derived from Ma-1, such teaching is in a direction away from the presently claimed invention. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from

the path that was taken by the applicant. The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant." In re Gurley, 31 U.S.P.Q.2d 1130, 1131 (Fed. Cir. 1994).

In view of the arguments above and the current record as a whole, the Appellants respectfully submit that the Examiner has not substantiated the obviousness rejection of the present claims based on the cited art. The Appellants thus request reversal of this rejection as applied to claims 13-23.

X. CONCLUSION

As is clear from the above as well as the arguments already of record, the approach taken by the Examiner and the rejections which flow therefrom clearly have no basis in law or fact. The Appellants, therefore, submit that the presently claimed invention is patentable over the art of record, request that the rejection of record be reversed, and further request that the Examiner be directed to:

- (i) allow claims 13-23, and
- (ii) advance the present application to issue at the earliest possible date.

Respectfully submitted,



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DATE: 16 Jan 2004

APPENDIX A

Claims 13-23 Pending in
Application Serial No. 09/120,608

13. An aqueous coating composition comprising:

(a) an aqueous vehicle comprising water and at least one organic co-solvent, wherein water comprises no more than 80% by weight of the total weight of the vehicle, and wherein the co-solvent is water-soluble or water-miscible so as to form a single phase vehicle with water;

(b) a pigment dispersion comprising a pigment and a polymeric dispersant, and

(c) a film-forming, non-ionic graft copolymer binder comprising a hydrophobic backbone and non-ionic, hydrophilic side chains, said side chains having a number average molecular weight of at least 500, wherein the graft copolymer is soluble in the vehicle but substantially insoluble in water.

14. The composition of claim 13, wherein said aqueous vehicle comprises 60-70% by weight of water based on the total weight of the vehicle.

15. The composition of claim 13, comprising:

(a) an aqueous vehicle comprising water, a water miscible pyrrolidone, and a glycol ether, wherein water comprises no more than 80% by weight, based on the total weight of the vehicle;

(b) a graft copolymer binder having a hydrophobic backbone and non-ionic, hydrophilic side chains, which binder is soluble in the aqueous vehicle but substantially insoluble in water; and

(c) a surfactant selected from the group consisting of silicon surfactants and fluorinated surfactants.

16. The composition of claim 13, wherein the graft copolymer backbone is comprised of monomers selected from the group consisting of methyl acrylate, methyl methacrylate, styrene, alpha-methyl styrene, phenyl acrylate, phenyl methacrylate, benzyl acrylate, benzyl methacrylate, 2-phenylethyl

acrylate, 2-phenylethyl methacrylate, 2-phenoxyethyl acrylate, 2-phenoxyethyl methacrylate, 1-naphthalyl acrylate, 2-naphthalyl acrylate, 2-naphthalyl methacrylate, p-nitrophenyl acrylate, p-nitrophenyl methacrylate, phthalimidomethyl acrylate, phthalimidomethyl methacrylate, N-phenyl acrylamide, N-phenyl methacrylamide, N-benzyl acrylamide, N-(2-phenylethyl)acrylamide, N-(2-phthalimidoethoxymethyl) acrylamide, vinyl benzoate, ethyl acrylate, n-butyl acrylate, 2-ethylhexyl acrylate, ethyl methacrylate, n-butyl methacrylate, t-butyl methacrylate, 2-ethylhexyl methacrylate, cyclohexyl methacrylate, vinyl acetate, and vinyl butyrate.

17. The composition of claim 13, wherein the side chains have a number average molecular weight of 1000-2000 and comprise macromonomers which are

(a) soluble in water but are insoluble in non-polar organic solvents; and

(b) made from non-ionic monomers selected from the group consisting of ethoxytriethylene glycol methacrylate, methoxy-polyethylene oxide methacrylate, methoxypolyethylene oxide acrylate, polyethylenoxide methacrylate, polyethylenoxide acrylate, and N-vinyl pyrrolidone.

18. The composition of claim 13, wherein the side chains comprise 15 - 60% by weight of the graft copolymer.

19. A washfast ink composition for use in printing of textiles comprising:

(a) an aqueous vehicle comprising water and at least one organic co-solvent, wherein water comprises no more than 80% by weight of the total weight of the vehicle, and wherein the co-solvent is water-soluble or water-miscible so as to form a single phase vehicle with water;

(b) a pigment dispersion comprising a pigment and a polymeric dispersant, and

(c) a film-forming, non-ionic graft copolymer binder comprising a hydrophobic backbone and non-ionic, hydrophilic side chains, said side chains having a number average molecular

weight of at least 500, wherein the graft copolymer is soluble in the vehicle but substantially insoluble in water.

20. The ink composition of claim 19, wherein said aqueous vehicle comprises 60-70% by weight of water based on the total weight of the vehicle.

21. The ink composition of claim 19, wherein the graft copolymer backbone is comprised of monomers selected from the group consisting of methyl acrylate, methyl methacrylate, styrene, alpha-methyl styrene, phenyl acrylate, phenyl methacrylate, benzyl acrylate, benzyl methacrylate, 2-phenylethyl acrylate, 2-phenylethyl methacrylate, 2-phenoxyethyl acrylate, 2-phenoxyethyl methacrylate, 1-naphthalyl acrylate, 2-naphthalyl acrylate, 2-naphthalyl methacrylate, p-nitrophenyl acrylate, p-nitrophenyl methacrylate, phthalimidomethyl acrylate, phthalimidomethyl methacrylate, N-phenyl acrylamide, N-phenyl methacrylamide, N-benzyl acrylamide, N-(2-phenylethyl)acrylamide, N-(2-phthalimidoethoxymethyl) acrylamide, vinyl benzoate, ethyl acrylate, n-butyl acrylate, 2-ethylhexyl acrylate, ethyl methacrylate, n-butyl methacrylate, t-butyl methacrylate, 2-ethylhexyl methacrylate, cyclohexyl methacrylate, vinyl acetate, and vinyl butyrate.

22. The ink composition of claim 19, wherein the side chains have a number average molecular weight of 1000-2000 and comprise macromonomers which are

(a) soluble in water but are insoluble in non-polar organic solvents; and

(b) made from non-ionic monomers selected from the group consisting of ethyoxytriethylene glycol methacrylate, methoxy-polyethylene oxide methacrylate, methoxypolyethylene oxide acrylate, polyethylenoxide methacrylate, polyethylenoxide acrylate, and N-vinyl pyrrolidone.

23. The ink composition of claim 19, wherein the side chains comprise 15-60% by weight of the graft copolymer.